

Y. TONY SONG
RESEARCH SCIENTIST

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Education

Ph.D., Applied Mathematics, Simon Fraser University (1990)

M.S., Applied Math, Chinese Academy of Sciences (1984)

B.S., Mathematics, Zhengzhou University (1981)

Research Interests

- Innovative remote sensing: Using GPS to detect tsunami scale and genesis; using GRACE Ocean-bottom-pressure to study ocean circulation
- Advanced ocean modeling: Developing S-coordinate system and pressure gradient schemes for community-user models, non-Boussinesq ROMS, and multi-scale fluid dynamics
- Coastal oceanography: Focusing on Asia Marginal Seas, flow interactions with topography, cross-shelf exchange, and coastal upwelling

Professional Experience

Jet Propulsion Laboratory (1998 – present):

Research Scientist, Earth Science Section (2001—present)

Senior Technical Staff, Ocean Science Element (1998–2001)

Bedford Institute of Oceanography: Research Associate (1996–1997)

Institute of Marine and Coastal Sciences, Rutgers University, New Jersey:

Research Assistant Professor (1993–1996); Postdoctorial Fellow (1991–1993)

Awards and Services

- Discover's **100 Top Stories of 2010**, #84 Yardstick for Killer Waves (real-time GPS detection of tsunami scales)
- **JPL Ed Stone Award** for Outstanding Research Publication: *Detecting tsunami genesis and scales directly from coastal GPS stations*, 2008
- **Contributing author** of the 2007 Nobel Peace Prize Winning IPCC Fourth Assessment, *Observations: Oceanic Climate Change and Sea Level*.
- NASA Tech Brief award # NPO44443-CN: *Parallelization of the Coupled Earthquake-Tsunami Model* (2007)
- **Guest editor** of the special section “Dynamics and Circulation of the Yellow, East, and South China Sea”, *JGR-Oceans* (2006)
- Jet Propulsion Laboratory Outstanding Accomplishment Award for *Successful Utilizing Jason Sea Level Observations and Advanced Numerical Models to Study the 2004 Indian Ocean Tsunami* (2005)
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Coordinate Rutgers University Mode, original developer)

Peer-Reviewed Publications

1. **Song, Y.T.** and F. Colberg, 2011: Deep ocean warming assessed from altimeters, Gravity Recovery and Climate Experiment, in situ measurements, and a non-Boussinesq ocean general circulation model, *J. Geophys. Res.*, **116**, C02020, doi:10.1029/2010JC006601.
2. **Song, Y. T.** and S.C. Han, 2011: Satellite observations defying the long-held tsunami genesis theory, *D.L. Tang (ed.), Remote Sensing of the Changing Oceans*, DOI 10.1007/978-3-642-16541-2, Springer-Verlag Berlin Heidelberg, in press.
3. **Song, Y.T.**, R. Gross, X. Wang, and V. Zlotnicki, 2010: A non-Boussinesq terrain-following OGCM for oceanographic and geodetic applications, *Advances in Geosciences*, **18** (Ocean Science, Eds. Gan et al.), 63-86.
4. Fok, H.S., H.B. Iz, C.K. Shum, Y. Yi, O. Andersen, A. Braun, Y. Chao, G. Han, C.Y. Kuo, K. Matsumoto, and **Y. T. Song**, 2010: Evaluation of ocean tide models used for Jason-2 altimetry corrections, *Marine Geodesy*, **33**, 285-303, doi:10.1080/01490419.2010.491027.
5. Qu, T. and **Y.T. Song**, 2009: Midoro Strait and Sibutu Passage transports estimated from satellite data, *Geophys. Res. Lett.*, **36**, L09601, doi:10.1029/2009GL037314.
6. Qu, T., **Y. T. Song**, and T. Yamagata, 2009: An Introduction to the South China Sea Throughflow: Its dynamics, variability, and application for climate, *Dynamics of Atmospheres and Oceans*, **47**, 3-14.
7. **Song, Y. T.** and V. Zlotnicki, 2008: The subpolar ocean-bottom-pressure oscillation and its links to ENSO, *Int. J. Remote Sensing*, Vol. **29** (21), 6091-6107.
8. Zheng, Q., **Y. T. Song**, L. H. Lin, X. Hu, J. Meng, and D. Wang, 2008: On generation source sites of internal waves in the Luzon Strait, *Act Oceanologica Sinica*, **27** (3), 38-50.
9. Xu, Q., Q. Zheng, H. Lin, Y. Liu, **Y. T Song**, and Y. Yuan, 2008: Dynamical analysis of mesiscale eddy-induced ocean internal waves using linear theories, *Act Oceanologica Sinica*, **27** (3), 60-69.
10. Zheng, Q., **Y. T. Song**, C.-R. Ho, and H. Lin, 2008: Statistics of internal waves in the South China Sea, *Satellite Remote Sensing of South China Sea* (ed. A. K. Liu et al), Chapter **4**, 67-80.
11. **Song, Y. T.**, L.-L. Fu, V. Zlotnicki, C. Ji, V. Hjorleifsdottir, C.K. Shum, and Y. Yi, 2008: The role of horizontal impulses of the faulting continental slope in generating the 26 December 2004 Tsunami, *Ocean Modelling*, doi:10.1016/j.ocemod.2007.10.007.
12. **Song, Y. T.**, 2007: Detecting tsunami genesis and scales directly from coastal GPS stations, *Geophys. Res. Lett.*, **34**, L19602, doi:10.1029/2007GL031681.
13. Zheng, Q., H. Lin, J. Meng, X. Hu, and **Y. T. Song**, 2007: Sub-mesoscale Ocean Vortex Trains in the Luzon Strait, *J. Geophys. Res.*, **112**, C03021, doi:10.1029/2006JC003551.

14. Zlotnicki, V., J. Wahr, I. Fukumori, and **Y. T. Song**, 2006: The Antarctic Circumpolar Current: seasonal transport variability during 2002-2005, *J. Phys. Oceanogr.*, 37, doi:10.1175/JPO3009.1.
15. **Song, Y. T.**, 2006: Estimation of interbasin transport using ocean bottom pressure: Theory and model for Asian marginal seas, *J. Geophys. Res.*, 111, C11S19, doi:10.1029/2005JC003189.
16. Zheng, Q., R. Dwi Susanto, Chung-Ru Ho, **Y. T. Song**, and Qing Xu, 2006: Statistical and dynamical analyses of generation mechanisms of solitary internal waves in the northern South China Sea, *JGR-Oceans*, 112, C03021, doi:10.1029/2006JC003551.
17. Zheng, Q., G. Fang, and **Y. T. Song**, 2006: Introduction to special section: Dynamics and circulation of the Yellow, East, and South China Sea, *J. Geophys. Res.*, 111, C11S01, doi:10.1029/2005JC003261.
18. **Song, Y. T.** and T. Y. Hou, 2006: Parametric vertical coordinate formulation for multiscale, Boussinesq, and non-Boussinesq ocean modeling, *Ocean Modelling*. Doi:10.1016/j.ocemod.2005.01.001.
19. **Song, Y. T.**, C. Ji, L.-L. Fu, V. Zlotnicki, C.K. Shum, Y. Yi, and V. Hjorleifsdottir, 2005: The 26 December 2004 Tsunami Source Estimated from Satellite Radar Altimetry and Seismic Waves, *Geophys. Res. Lett.*, 23, doi:10.1029/2005GL023683.
20. Wang, P., **Y. T. Song**, Y. Chao, and H. Zhang, 2005: Parallel computation of the Regional Ocean Model System (ROMS), *International Journal of High Performance Computing Applications*, Volume 19, No. 4, 375-385, UCRL-JRNL-211096.
21. **Song, Y. T.** and V. Zlotnicki, 2004: Ocean bottom pressure waves predicted in the tropical Pacific, *Geophys. Res. Lett.*, Vol. 31, No. 5, L05306, 10.1029/2003GL018980.
22. Glenn, S. M., Arnone, R., Bergmann, T., Bissett, W. P., Crowley, M., Cullen, J., Gryzmski, J., Haidvogel, D., Kohut, J., Moline, M. A., Oliver, M., Orrico, C., Sherrell, R., **Song, Y. T.**, Weidemann, A., Chant, R., Schofield, 2004: The Biogeochemical impact of summertime coastal upwelling in the Mid-Atlantic Bight. *J. Geophys. Res.*, **109** (C12S02), DOI:10.1029/2003JC002265.
23. **Song, Y. T.** and Y. Chao, 2004: The role of topography in coastal upwelling and cross-shore exchange: A theoretical study, *Ocean Modelling*, **6**(2), 151-176.
24. **Song, Y. T.** and T. Tang, 2002: Eddy-resolving simulations for the Asian marginal seas and Kuroshio using the nonlinear-terrain following coordinate system, *J. Korean Oceanogr.*, **37**(3), 167-177.
25. **Song, Y. T.**, D. Haidvogel, and S. Glenn, 2001: The effects of topographic variability on the formation of upwelling centers off New Jersey: A theoretical model, *J. Geophys. Res.* **106**, 9223-9240.
26. **Song, Y. T.** and Y. Chao, 2000: An embedded bottom boundary layer formulation for z-coordinate ocean models, *J. Atmos. Oceanic Tech.*, **17**, 546-560.
27. **Song, Y. T.** 1998: A general pressure gradient formulation for ocean models. Part I: Scheme design and diagnostic analysis, *Monthly Weather Review*, **126**, 3213-3230.

28. **Song, Y. T.** and D. Wright, 1998: A general pressure gradient formulation for ocean models. Part II: Energy, momentum, and bottom torque consistency, *Monthly Weather Review*, **126**, 3231-3247.
29. Glenn, S., M. Crowley, D. Haidvogel, and **Y. T. Song**, 1996: Underwater observatory captures coastal upwelling events off New Jersey, *EOS Trans. Amer. Geophys. Union*, **77**, 233, 236.
30. Lardner, R. W. and **Y. Song**, 1995: Optimal estimation of eddy viscosity and friction coefficients for a quasi-three-dimensional numerical tidal model, *Atmosphere-Ocean*, **33**, 581-611.
31. **Song, Y.** and T. Tang, 1994: On staggered Turkel-Zwas type schemes for the two-dimensional shallow water equations. *Monthly Weather Review*, **122** (1), 223-234.
32. **Song, Y.** and D. Haidvogel, 1994: A semi-implicit primitive equation ocean circulation model using a generalized topography-following coordinate system. *J. Comput. Phys.*, **115**, 228-244. (**This paper has been cited over 160 times as of 2007.**)
33. **Song, Y.**, S. L. Das, and R. W. Lardner, 1994: Computation of density driven flows using the spectral method: Application to the Arabian Gulf. *Cont. Shelf Res.*, **14**, 1039-1052.
34. **Song, Y.** and D. Haidvogel, 1993: Numerical simulations of California Current System under the joint effect of coastal geometry and surface forcing, in M.L.Spaulding et al. (eds). *Estuarine and Coastal Modeling*, **3**, 216-234.
35. **Song, Y.** and T. Tang, 1993: Dispersion and group velocity in numerical schemes for three-dimensional hydrodynamic equations. *J. Comput. Phys.*, **105**, 72-82.
36. Lardner, R. W. and **Y. Song**, 1992: A comparison of spatial grids for numerical modeling of lows in near-coast seas, *Int. J. Numer. Methods. Fluids*, **14**, 109-124.
37. Lardner, R. W. and **Y. Song**, 1992: A hybrid spectral method for the three-dimensional numerical modeling of nonlinear flows in shallow seas, *J. Comput. Phys.*, **100**, 322-334.
38. Lardner, R. W. and **Y. Song**, 1991: An Algorithm for three-dimensional convection and diffusion with very different horizontal and vertical length scales, *Int. J. Numer. Methods Engineering.*, **32**, 1303-1319.
39. **Song, Y.** and M. Yang, 1986: Spectral approximation theory for multigroup neutron transport operators, *Acta Mathematica Scientia*, 6 (3), 339-352.
40. Zheng, S. and **Y. Song**, 1985: Characteristics of $p>1$ -order quasi-collectively compact operator and its applications, *Science bulletin* (in Chinese), **12**, 896-900.
41. **Song, Y.**, 1983: A non-linear singular Sturm-Liouville problem, *Journal of Zhengzhou University* (published in college), **1**, 35-39.